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MULCH TILLAGE in the SOUTHEAST

• Planting and Cultivating in Crop Residue

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MULCH TILLAGE in the SOUTHEAST

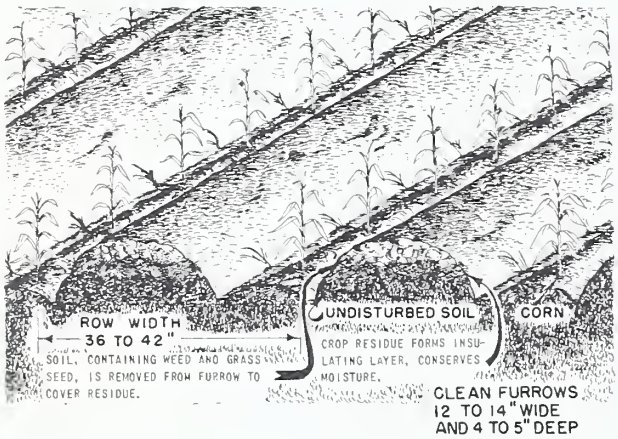
• Planting and Cultivating in Crop Residue

By J. T. McAlister, equipment engineer, Soil Conservation Service

IN ALL parts of the country there is a move toward "minimum tillage"—that is, stirring the soil just as little as possible in producing a crop.

Mulch tillage is the southeastern Coastal Plain's form of minimum tillage. Row crops are planted directly in cover crops, in established sods, or in crop residues of the previous crop without any land preparation beforehand. It is somewhat similar to practices known as plow planting and wheel-track planting in other areas.

Mulch tillage is possible because of the advancements made in farm equipment in the last 10 to 15 years. It requires different equipment or attachments from that on many farms.


ROW WIDTH
36 TO 42"
SOIL, CONTAINING WEED AND GRASS SEED, IS REMOVED FROM FURROW TO COVER RESIDUE.
UNDISTURBED SOIL
CROP RESIDUE FORMS INSULATING LAYER, CONSERVES MOISTURE.
CORN
CLEAN FURROWS 12 TO 14" WIDE AND 4 TO 5" DEEP

Details of the planting method in mulch-tillage farming. Seed is planted in a firm furrow made with a lister planter. Soil from the furrow covers the crop residue in the middles between the furrows and keeps the weeds from getting ahead of the planted crop. Tractor wheels move on unworked ground, which helps prevent soil compaction, delays weed growth, and hastens decay of the residue.

Benefits of Mulch Tillage

Mulch tillage saves time and labor—and therefore money—and at extremely busy times of the year. It saves because you don't have to burn, plow, disk, or harrow before you plant row crops. In the spring you can plant at the time that you would normally be plowing. And after grain harvest your planter can follow right behind your combine. (See cover picture.)

Mulch tillage saves both soil and moisture. Moreover, it makes use of crop residues to improve the soil structure or tilth, maintain organic matter, and provide good working conditions for soil bacteria.

Winter cover crops and crop residue can remain on the land longer in winter and into the spring, giving longer protection against wind and water erosion.

It supplements terracing, stripcropping, and other well-known erosion-control practices for sloping land. Since there is no plowing there are no dead furrows to disturb row drainage and less maintenance is required on terraced land. On gentle slopes mulch tillage on the contour may replace terracing and stripcropping since each mulch-tilled furrow acts as a miniature terrace.

Mulch tillage protects flatland from wind erosion and the impact of falling raindrops. And the furrows protect young plants from wind damage.

Mulch tillage saves moisture by slowing down evaporation as well as runoff since plowing, harrowing, and burning dry out the soil. Sometimes this means you can plant when you would otherwise have to wait for rain. And when it does rain, the unworked crop residue in the middles lets water soak in before it has a chance to evaporate or run off.

SC–D22–15

Contour-listed furrows slow down runoff and soil loss between terraces.

Soils Suitable for Mulch Planting

So far in the Southeast, mulch tillage has had its widest acceptance in areas where soils with sandy loams and loamy sands are common. These soils make up most of the area planted to annual row crops and small grain in the Coastal Plain. They are friable, level to sloping, well-drained, acid soils. They have medium organic content and low to medium moisture-holding capacity. Water moves through them easily.

Successful plantings are also being made in heavier (finer textured) soils and poorly drained soils. But direct lister planting is difficult to apply in heavy, eroded soil and soils that have been compacted by grazing. If they are dry, hard, and not right for breaking with a moldboard plow, direct planting should not be attempted.

Crops Adapted to Mulch Planting

Mulch tillage in the Southeast was first used for planting soybeans in grain stubble without first burning the straw and stubble. The planter followed directly behind the combine. This left the crop residue on the land to improve the soil and help conserve soil and water. Also it meant that the beans could be planted earlier—the moisture was right for planting without waiting for rain.

Now equipment has been developed to plant corn in established sod and in winter cover crops such as blue lupine, oats, and vetch without plowing the land ahead of planting. Such direct planting allows maximum growth of the cover crop for soil improvement.

Dairy and beef cattle farmers find they can plant their corn directly in their winter-grazing crops, or they can plant it after small grain that has been cut for hay, silage, or "green chop." Soybeans, sorghums, and millet can also be planted in winter-grazing crops.

GA–D18–38

Planting soybeans in oat stubble right after combining. Note that the tractor wheels are moving on unworked ground.

GA–D18–37

Planting corn in the previous year's soybean stubble.

GA–W–1

Cross section of a row middle showing completely covered corn-stover residue. After mulch planting, the soil from the furrow is on top of the residue.

GA–D10–32

Shredded corn stover protects the soil through the winter. The new crop can be mulch planted in the spring without any previous plowing.

SC–D22–18

Compacted soils may need to be broken up before mulch planting. Here corn is being planted in grazed rye.

How To Handle Crop Residues

The way small-grain residues are handled varies, depending on the crop and the yield.

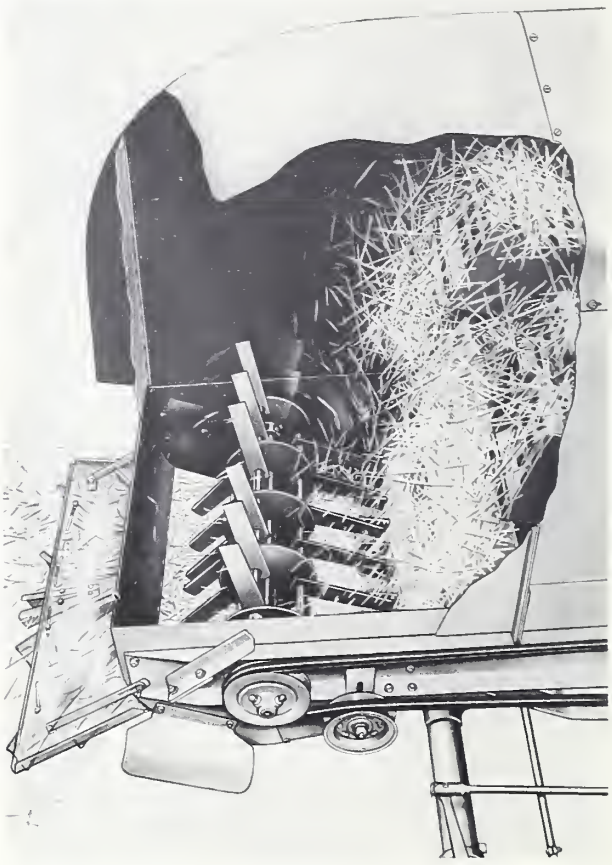
Wheat straw and stubble give the most trouble in planting; the straw is stiff and slow to decay. Rye, barley, and oat straw are easier to handle. Loose straw windrowed on high stubble by a combine also makes planting difficult.

Straw-chopper attachments to combines do the best job of putting the straw in good condition for planting. They cut the straw into short pieces and spread it evenly on the ground. Rotary mowers can also be used to shred both straw and stubble.

Tall growth from winter cover or grazing crops also needs to be shredded with a rotary mower before direct planting.

Shred corn stover with a rotary mower after combining or picking. This provides good winter cover that protects the soil from wind and water erosion. You can then mulch plant in the spring.

Before mulch planting corn in established coastal bermudagrass sod, the grass should be mowed or grazed closely. Heavy compacted sod may need to be broken up ahead of the planter. This can be done with a subsoil point.



Straw-chopper attachment for combine.

SC–D22–21

Corn and soybeans being planted directly in 11-year-old coastal bermudagrass sod.

SC–W–2

Regrowth of coastal bermudagrass, ready for grazing after mulch-planted corn had been harvested for silage. The corn, planted May 3 and harvested August 10, yielded 18.2 tons of silage per acre.

Getting a Stand

Seedbeds should be firm, as every farmer knows. But not all know that only the soil next to the seed need be firm. It is the close contact between seed and soil that gives quick germination. If the soil between rows is stirred and then packed, you have a good seedbed for weeds and grass. And weeds and grass generally grow faster than your planted row crop.

How To Mulch Plant

Furrow planting that has long been common in the Southeast is similar to the direct lister planting used in mulch tillage.

The drawing on page 2 shows the kind of clean furrow made with a lister planter. In making the furrows, all the crop residue on the soil surface is either moved or covered and is confined to about two-thirds of the area occupied before planting. It forms an insulating layer that holds moisture in the undisturbed "middles" between the fur rows. The soil on top of the insulating layer contains weed and grass seed. But this soil dries out before the weeds and grass get started—since the insulating layer stops the upward movement of moisture. Thus the plants in the furrows have less competition from weeds than when planted in the conventional way.

Planting seeds in furrows 4 or 5 inches deep places them closer to moisture than in the usual planting. The exposed soil warms quickly in the spring. Covering the crop residues promotes their decay, besides delaying weed growth. And since the middles are not disturbed until late cultivation they hold moisture for use of the growing crop during dry periods.

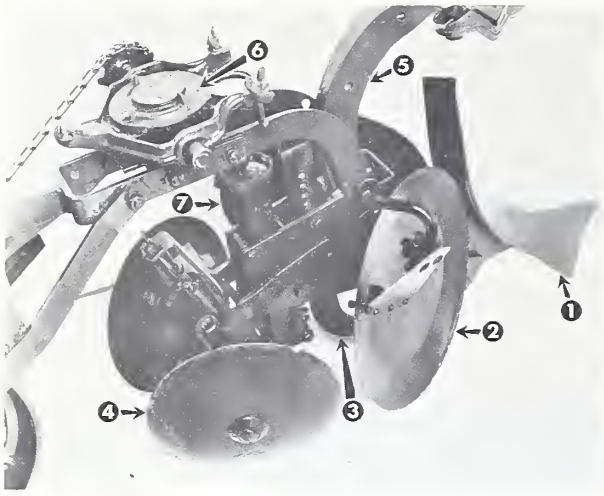
Row Widths

Rows can be from 36 to 42 inches wide but 38- or 40-inch widths have proved most satisfactory. The 42-inch widths leave residue uncovered and let weeds grow. The 36-inch widths result in high beds in the middles that make cultivating difficult. Rows closer than 36 inches are not adapted to this method.

Planting Equipment

Planters in common use on farms in the Southeast have been tried for mulch tillage but they do not have the strength required for this direct planting. By adding furrow openers, such as disks and middlebuster shovels, they can be used for mulch tillage on light soils that have only a little crop residue left on them.

Lister planters in standard production have been adapted for direct planting in residues. Two types have proved satisfactory. One is the rotary disk with hard-ground openers. The other is the middlebuster opener. The rotary disk makes a



SD—D22—20

Rotary disk lister with hard-ground opener: (1) Hard-ground furrow opener, (2) opener disks, (3) seed-furrow opener, (4) covering disks, (5) supporting beam to tool bar with attachment to tractor, (6) seed-hopper drive and support, and (7) seed boot.

SC—D31—1

A lister planter that leaves undisturbed topsoil in the furrow.

wide sloping furrow and rounded row middle. The middlebuster makes a vertical furrow and flatter middle than the rotary disk.

The lister does both land breaking and planting in one operation. About one-third of the row width is disturbed (see p. 2). Moisture is held in the row middle for use as the plant grows. In heavy soils, a subsoil-type seed-furrow opener does the best job of planting. In lighter soils the runner type is satisfactory. Rear-mounted covering disks move clean loose soil from the side of the furrow on the seed ahead of the planter press wheel.

A variation in lister planters is available that leaves undisturbed topsoil in the furrow. Seed is planted in this topsoil. Small furrows on each side protect against drowning after rains. The moist undisturbed topsoil gives quick germination.

Applying Fertilizer

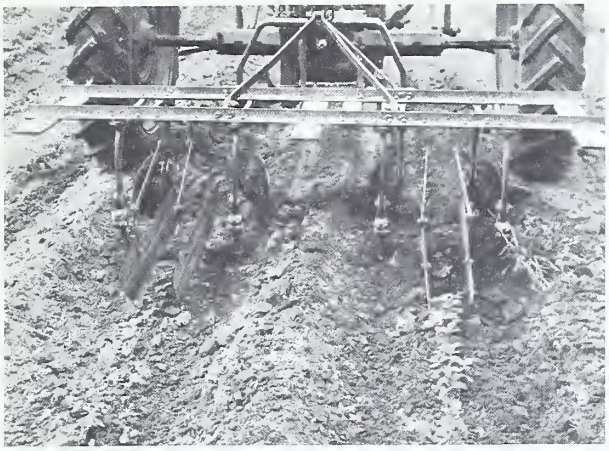
Fertilizer can be applied in the usual way, since lister planters can be equipped with the fertilizer attachments in common use on all planters. But special care should be taken to keep fertilizer from touching the seed. Such contact can affect germination, especially germination of soybeans. Soybeans following a well-fertilized crop show little response to direct fertilizing according to many southeastern agricultural experiment stations.

Cultivating

Cultivating crops planted in listed furrows requires a change from usual methods. The main difference is that you cultivate next to the rows and leave the middles unworked. Continue in this manner until plants are 6 to 12 inches high. Tractor wheels operate on the unworked middles and

SC—D22—16

First cultivation of mulch-planted corn. The front wheels of this tricycle tractor are reversed to tread the ridge. The undisturbed middles and the reversed wheels make it easy to guide the tractor.



MISS–W–2

First cultivation of mulch-planted soybeans—with disk hillers followed by 12-inch half sweeps. The beans were planted in heavy oat stubble and straw.

press the soil on the residue. If the residue has been well covered it is difficult for weeds and grass to grow through the mass of material.

If you work the middles during early plant growth, shovels and sweeps will clog and bunch the residue. Weeds and grass come quickly when beds are opened.

If you cultivate in the recommended way, by the last cultivation the beds will have settled and decay of residue usually will be advanced. If it is, you can then level the middles with a wide sweep. If the residue gives trouble, you can use disk hillers, set at a slight angle to move soil to the plants, followed by a wide sweep.

GA–D18–39

Second cultivation of mulch-planted soybeans. Note that the tractor wheels still move on unplowed ground and that there is no weed problem.

SC–D22–17

Disk hillers and sweeps hold this rear-mounted cultivator in place. Tractor wheels move on undisturbed ground.

Cultivating Equipment

Front- or rear-mounted two- or four-row cultivators can be used for cultivating. For early cultivation set disk hillers on either type of cultivator next to the row; set 6- or 8-inch sweeps behind hillers and 1 inch lower. Half sweeps allow you to work closer to the plants. The disks move any grass and weeds away from rows; the sweep move clean loose soil to the plants and cover weeds. In hard soil, you can substitute narrow pointed shovels or spring teeth for sweeps to loosen soil.

Operating Tractors on Middles

Operating tractors on middles may seem difficult. But it will not be if the recommended procedure is followed. The most difficult part for many operators is remembering that the middles should not be plowed. The undisturbed middles provide firm footing for the tractor wheels. If you plow before planting you may have trouble guiding the tractor on the loose middles.

Use either tricycle or wide front wheel tractors. Keep tire pressure at not more than 10 to 12 pounds. Be sure you have the correct wheel setting to fit the middles. For example, for 38-inch rows, rear tractor wheels should measure exactly 76 inches center-to-center of tires. Use the same setting for wide front wheels. Or set wide front wheels just inside the middles so as to press against them. Reversing the front wheels on tricycle tractors gives a wide space between them that fits the middles and holds the tractor in place.

SC—D26—3

Why burn this organic matter? With mulch tillage you can plant soybeans directly in stubble and leave all plant residue to protect and enrich the soil.

The residue covered in middles in direct planting acts as a cushion and minimizes soil compaction by tractor wheels. Firm middles permit earlier cultivation after rains.

Do not use tie or stabilizer bars from rear-mounted cultivator to tractor, or disk coulter in center of cultivator, until the last cultivation. The disk hillers and sweeps operating in furrows, against firm middles, hold the cultivator in place and allow freedom in steering the tractor.

Production Costs and Yields

Some farmers report that mulch tillage has saved them enough in labor and fuel to pay for a lister planter—because it cuts out the plowing, disking and harrowing before planting. Mulch tillage lowers immediate production costs as well as costs when the longtime benefits are figured in.

Where it is properly carried out, yields are equal to and in many cases above those obtained by the usual methods. The Soil Conservation Service man in your soil conservation district can give you technical help in carrying out mulch tillage properly.

SC—D22—19

Mulch tillage in strips on terraced land.

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